

SEQUENCE LISTING

<110> Bayer CropScience GmbH

<120> Plant cells and plants which synthesize a starch with an increased final viscosity

<130> BCS 02 5002 - PCT

<150> EP 02028530.0

<151> 2002-12-19

<150> EP 03090275.3

<151> 2003-08-29

<160> 8

<170> PatentIn version 3.1

<210> 1

<211> 4167

<212> DNA

<213> Solanum tuberosum

<220>

<221> CDS

<222> (207) .. (3899)

<223>

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<301> Abel, G.J., Springer, F., Willmitzer, L. and Kossmann, J.

<302> Cloning and functional analysis of a cDNA encoding a novel
139 kDa

<303> Plant J.

<304> 10

<305> 6

<306> 981-991

<307> 1996

<308> X94400

<309> 1995-12-22

<313> (1)..(4167)

<300>

<308> EMBL / X94400

<309> 1997-04-16

<313> (1)..(4167)

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233

Met Asp Val Pro Phe Pro Leu His Arg

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Lys Pro Phe Leu Gly Phe Val Ser His Gly Thr Thr Ser Leu Ser Val

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Gln Ser Ser Ser Trp Arg Lys Asp Gly Met Val Thr Gly Val Ser Phe

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Thr Arg Ser Gln Gly Ser Ser Pro Lys Gly Phe Val Pro Arg Lys Pro

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521

Ser Gly Met Ser Thr Gln Arg Lys Val Gln Lys Ser Asn Gly Asp Lys

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569

Glu Ser Gln Ser Thr Ser Thr Ser Lys Glu Ser Glu Ile Ser Asn Gln

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617
Lys Thr Val Glu Ala Arg Val Glu Thr Ser Asp Asp Asp Thr Lys Val

125 130 135

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665
Val Val Arg Asp His Lys Phe Leu Glu Asp Glu Asp Glu Ile Asn Gly

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713
Ser Thr Lys Ser Ile Ser Met Ser Pro Val Arg Val Ser Ser Gln Phe

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761
Val Glu Ser Glu Glu Thr Gly Gly Asp Asp Lys Asp Ala Val Lys Leu

170 175 180 185

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809

Asn Lys Ser Lys Arg Ser Glu Glu Ser Asp Phe Leu Ile Asp Ser Val

190 195 200

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857
Ile Arg Glu Gln Ser Gly Ser Gln Gly Glu Thr Asn Ala Ser Ser Lys

205 210 215

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220 225 230

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Val Glu Pro Gln Gln Leu Lys Glu Asn Asn Ala Gly Asn Val Glu Tyr

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aaa gga cct gta gca agt aag cta ttg gaa att act aag gct agt gat
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Lys Gly Pro Val Ala Ser Lys Leu Leu Glu Ile Thr Lys Ala Ser Asp

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gtg gaa cac act gaa agc aat gag att gat gac tta gac act aat agt
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Val Glu His Thr Glu Ser Asn Glu Ile Asp Asp Leu Asp Thr Asn Ser

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Phe Phe Lys Ser Asp Leu Ile Glu Glu Asp Glu Pro Leu Ala Ala Gly

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aca gtg gag act gga gat tct tct ctá aac tta aga ttg gag atg gaa
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gca aat cta cgt agg cag gct ata gaa agg ctt gcc gag gaa aat tta
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Ala Asn Leu Arg Arg Gln Ala Ile Glu Arg Leu Ala Glu Glu Asn Leu

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1241

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gaa gat gtc gag ata ttt ctt aac aga ggt ctt tcc act ttg aag aat
1289

Glu Asp Val Glu Ile Phe Leu Asn Arg Gly Leu Ser Thr Leu Lys Asn

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gag tct gat gtc ttg att atg gga gct ttt aat gag tgg cgc tat agg
1337

Glu Ser Asp Val Leu Ile Met Gly Ala Phe Asn Glu Trp Arg Tyr Arg

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tct ttt act aca agg cta act gag act cat ctc aat gga gat tgg tgg
1385

Ser Phe Thr Thr Arg Leu Thr Glu Thr His Leu Asn Gly Asp Trp Trp

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1433

Ser Cys Lys Ile His Val Pro Lys Glu Ala Tyr Arg Ala Asp Phe Val

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1481

Phe Phe Asn Gly Gln Asp Val Tyr Asp Asn Asn Asp Gly Asn Asp Phe

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gct gaa aga gaa aga cta gcg gaa gaa caa aga cga ata gaa gca gag
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Ala Glu Arg Glu Arg Leu Ala Glu Glu Gln Arg Arg Ile Glu Ala Glu

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Lys Ala Glu Ile Glu Ala Asp Arg Ala Gln Ala Lys Glu Glu Ala Ala

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Lys Lys Lys Val Leu Arg Glu Leu Met Val Lys Ala Thr Lys Thr

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1769
Arg Asp Ile Thr Trp Tyr Ile Glu Pro Ser Glu Phe Lys Cys Glu Asp

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1817
Lys Val Arg Leu Tyr Tyr Asn Lys Ser Ser Gly Pro Leu Ser His Ala

525 530 535

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1865
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1961
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570 575 580 585

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2009
Val Phe Ala Asp Gly Pro Pro Lys His Ala Ile Ala Tyr Asp Asn Asn

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His Arg Gln Asp Phe His Ala Ile Val Pro Asn His Ile Pro Glu Glu

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2105
Leu Tyr Trp Val Glu Glu His Gln Ile Phe Lys Thr Leu Gln Glu

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625

630

gag aga agg ctt aga gaa gcg gct atg cgt gct aag gtt gaa aaa aca
2153
Glu Arg Arg Leu Arg Glu Ala Ala Met Arg Ala Lys Val Glu Lys Thr

635

640

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gca ctt ctg aaa act gaa aca aag gaa aga act atg aaa tca ttt tta
2201
Ala Leu Leu Lys Thr Glu Thr Lys Glu Arg Thr Met Lys Ser Phe Leu

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660

665

ctg tct cag aag cat gta gta tat act gag cct ctt gat atc caa gct
2249
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gga agc agc gtc aca gtt tac tat aat ccc gcc aat aca gta ctt aat
2297
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Gly Lys Pro Glu Ile Trp Phe Arg Cys Ser Phe Asn Arg Trp Thr His

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2393
Arg Leu Gly Pro Leu Pro Pro Gln Lys Met Ser Pro Ala Glu Asn Gly

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2441
Thr His Val Arg Ala Thr Val Lys Val Pro Leu Asp Ala Tyr Met Met

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750 755 760

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2537
Ser Gly Met Asp Tyr His Ile Pro Val Phe Gly Gly Val Ala Lys Glu

765 770 775

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2585
Pro Pro Met His Ile Val His Ile Ala Val Glu Met Ala Pro Ile Ala

780 785 790

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Lys Val Gly Gly Leu Gly Asp Val Val Thr Ser Leu Ser Arg Ala Val

795 800 805

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2681
Gln Asp Leu Asn His Asn Val Asp Ile Ile Leu Pro Lys Tyr Asp Cys

810 815 820 825

ttg aag atg aat aat gtg aag gac ttt cgg ttt cac aaa aac tac ttt
2729

Leu Lys Met Asn Asn Val Lys Asp Phe Arg Phe His Lys Asn Tyr Phe
830 835 840

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Trp Gly Gly Thr Glu Ile Lys Val Trp Phe Gly Lys Val Glu Gly Leu
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tcg gtc tat ttt ttg gag cct caa aac ggg tta ttt tcg aaa ggg tgc
2825
Ser Val Tyr Phe Leu Glu Pro Gln Asn Gly Leu Phe Ser Lys Gly Cys
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Val Tyr Gly Cys Ser Asn Asp Gly Glu Arg Phe Gly Phe Phe Cys His
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2969
His Cys His Asp Trp Ser Ser Ala Pro Val Ala Trp Leu Phe Lys Glu
910 915 920

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3017
Gln Tyr Thr His Tyr Gly Leu Ser Lys Ser Arg Ile Val Phe Thr Ile
925 930 935

cat aat ctt gaa ttt ggg gca gat ctc att ggg aga gca atg act aac
3065
His Asn Leu Glu Phe Gly Ala Asp Leu Ile Gly Arg Ala Met Thr Asn
940 945 950

gca gac aaa gct aca aca gtt tca cca act tac tca cag gag gtg tct
3113

Ala Asp Lys Ala Thr Thr Val Ser Pro Thr Tyr Ser Gln Glu Val Ser

955 960

965

gga aac cct gta att gcg cct cac ctt cac aag ttc cat ggt ata gtg
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Gly Asn Pro Val Ile Ala Pro His Leu His Lys Phe His Gly Ile Val

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Asn Gly Ile Asp Pro Asp Ile Trp Asp Pro Leu Asn Asp Lys Phe Ile

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Leu Pro Leu Val Gly Ile Ile Thr Arg Leu Thr His Gln Lys Gly

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3389

Ile His Leu Ile Lys His Ala Ile Trp Arg Thr Leu Glu Arg Asn

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 Asn Asp Phe Val Asn Leu Ala Asn Gln Leu His Ser Lys Tyr Asn
 1080 1085 1090

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 1140 1145 1150

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 3749
 Pro Asn Gly Phe Ser Phe Asp Gly Ala Asp Ala Gly Gly Val Asp

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3794

Tyr Ala Leu Asn Arg Ala Leu Ser Ala Trp Tyr Asp Gly Arg Asp

1185

1190

1195

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3839

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1200

1205

1210

tgg aac cga cct gct ctt gat tat ttg gag ctt tac cat gct gct
3884

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1220

1225

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3939

Arg Lys Leu Glu

1230

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<212> PRT

<213> Solanum tuberosum

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35 40 45

Asp Gly Met Val Thr Gly Val Ser Phe Pro Phe Cys Ala Asn Leu Ser
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Gly Arg Arg Arg Arg Lys Val Ser Thr Thr Arg Ser Gln Gly Ser Ser
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Pro Lys Gly Phe Val Pro Arg Lys Pro Ser Gly Met Ser Thr Gln Arg
85 90 95

Lys Val Gln Lys Ser Asn Gly Asp Lys Glu Ser Gln Ser Thr Ser Thr
100 105 110

Ser Lys Glu Ser Glu Ile Ser Asn Gln Lys Thr Val Glu Ala Arg Val
115 120 125

Glu Thr Ser Asp Asp Asp Thr Lys Val Val Val Arg Asp His Lys Phe
130 135 140

Leu Glu Asp Glu Asp Glu Ile Asn Gly Ser Thr Lys Ser Ile Ser Met
145 150 155 160

Ser Pro Val Arg Val Ser Ser Gln Phe Val Glu Ser Glu Glu Thr Gly
165 170 175

Gly Asp Asp Lys Asp Ala Val Lys Leu Asn Lys Ser Lys Arg Ser Glu
180 185 190

Glu Ser Asp Phe Leu Ile Asp Ser Val Ile Arg Glu Gln Ser Gly Ser
195 200 205

Gln Gly Glu Thr Asn Ala Ser Ser Lys Gly Ser His Ala Val Gly Thr
210 215 220

Lys Leu Tyr Glu Ile Leu Gln Val Asp Val Glu Pro Gln Gln Leu Lys
225 230 235 240

Glu Asn Asn Ala Gly Asn Val Glu Tyr Lys Gly Pro Val Ala Ser Lys
245 250 255

Leu Leu Glu Ile Thr Lys Ala Ser Asp Val Glu His Thr Glu Ser Asn
260 265 270

Glu Ile Asp Asp Leu Asp Thr Asn Ser Phe Phe Lys Ser Asp Leu Ile
275 280 285

Glu Glu Asp Glu Pro Leu Ala Ala Gly Thr Val Glu Thr Gly Asp Ser
290 295 300

Ser Leu Asn Leu Arg Leu Glu Met Glu Ala Asn Leu Arg Arg Gln Ala
305 310 315 320

Ile Glu Arg Leu Ala Glu Glu Asn Leu Leu Gln Gly Ile Arg Leu Phe
325 330 335

Cys Phe Pro Glu Val Val Lys Pro Asp Glu Asp Val Glu Ile Phe Leu
340 345 350

Asn Arg Gly Leu Ser Thr Leu Lys Asn Glu Ser Asp Val Leu Ile Met
355 360 365

Gly Ala Phe Asn Glu Trp Arg Tyr Arg Ser Phe Thr Thr Arg Leu Thr
370 375 380

Glu Thr His Leu Asn Gly Asp Trp Trp Ser Cys Lys Ile His Val Pro
385 390 395 400

Lys Glu Ala Tyr Arg Ala Asp Phe Val Phe Phe Asn Gly Gln Asp Val
405 410 415

Tyr Asp Asn Asn Asp Gly Asn Asp Phe Ser Ile Thr Val Lys Gly Gly
420 425 430

Met Gln Ile Ile Asp Phe Glu Asn Phe Leu Leu Glu Glu Lys Trp Arg
435 440 445

Glu Gln Glu Lys Leu Ala Lys Glu Gln Ala Glu Arg Glu Arg Leu Ala
450 455 460

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465 470 475 480

Arg Ala Gln Ala Lys Glu Glu Ala Ala Lys Lys Lys Lys Val Leu Arg
485 490 495

Glu Leu Met Val Lys Ala Thr Lys Thr Arg Asp Ile Thr Trp Tyr Ile
500 505 510

Glu Pro Ser Glu Phe Lys Cys Glu Asp Lys Val Arg Leu Tyr Tyr Asn
515 520 525

Lys Ser Ser Gly Pro Leu Ser His Ala Lys Asp Leu Trp Ile His Gly
530 535 540

Gly Tyr Asn Asn Trp Lys Asp Gly Leu Ser Ile Val Lys Lys Leu Val
545 550 555 560

Lys Ser Glu Arg Ile Asp Gly Asp Trp Trp Tyr Thr Glu Val Val Ile
565 570 575

Pro Asp Gln Ala Leu Phe Leu Asp Trp Val Phe Ala Asp Gly Pro Pro
580 585 590

Lys His Ala Ile Ala Tyr Asp Asn Asn His Arg Gln Asp Phe His Ala
595 600 605

Ile Val Pro Asn His Ile Pro Glu Glu Leu Tyr Trp Val Glu Glu Glu
610 615 620

His Gln Ile Phe Lys Thr Leu Gln Glu Glu Arg Arg Leu Arg Glu Ala
625 630 635 640

Ala Met Arg Ala Lys Val Glu Lys Thr Ala Leu Leu Lys Thr Glu Thr
645 650 655

Lys Glu Arg Thr Met Lys Ser Phe Leu Leu Ser Gln Lys His Val Val
660 665 670

Tyr Thr Glu Pro Leu Asp Ile Gln Ala Gly Ser Ser Val Thr Val Tyr
675 680 685

Tyr Asn Pro Ala Asn Thr Val Leu Asn Gly Lys Pro Glu Ile Trp Phe
690 695 700

Arg Cys Ser Phe Asn Arg Trp Thr His Arg Leu Gly Pro Leu Pro Pro
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Gln Lys Met Ser Pro Ala Glu Asn Gly Thr His Val Arg Ala Thr Val
725 730 735

Lys Val Pro Leu Asp Ala Tyr Met Met Asp Phe Val Phe Ser Glu Arg
740 745 750

Glu Asp Gly Gly Ile Phe Asp Asn Lys Ser Gly Met Asp Tyr His Ile
755 760 765

Pro Val Phe Gly Gly Val Ala Lys Glu Pro Pro Met His Ile Val His
770 775 780

Ile Ala Val Glu Met Ala Pro Ile Ala Lys Val Gly Gly Leu Gly Asp
785 790 795 800

Val Val Thr Ser Leu Ser Arg Ala Val Gln Asp Leu Asn His Asn Val
805 810 815

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820 825 830

Asp Phe Arg Phe His Lys Asn Tyr Phe Trp Gly Gly Thr Glu Ile Lys
835 840 845

Val Trp Phe Gly Lys Val Glu Gly Leu Ser Val Tyr Phe Leu Glu Pro
850 855 860

Gln Asn Gly Leu Phe Ser Lys Gly Cys Val Tyr Gly Cys Ser Asn Asp
865 870 875 880

Gly Glu Arg Phe Gly Phe Phe Cys His Ala Ala Leu Glu Phe Leu Leu
885 890 895

Gln Gly Gly Phe Ser Pro Asp Ile Ile His Cys His Asp Trp Ser Ser
900 905 910

Ala Pro Val Ala Trp Leu Phe Lys Glu Gln Tyr Thr His Tyr Gly Leu
915 920 925

Ser Lys Ser Arg Ile Val Phe Thr Ile His Asn Leu Glu Phe Gly Ala
930 935 940

Asp Leu Ile Gly Arg Ala Met Thr Asn Ala Asp Lys Ala Thr Thr Val
945 950 955 960

Ser Pro Thr Tyr Ser Gln Glu Val Ser Gly Asn Pro Val Ile Ala Pro
965 970 975

His Leu His Lys Phe His Gly Ile Val Asn Gly Ile Asp Pro Asp Ile
980 985 990

Trp Asp Pro Leu Asn Asp Lys Phe Ile Pro Ile Pro Tyr Thr Ser Glu
995 1000 1005

Asn Val Val Glu Gly Lys Thr Ala Ala Lys Glu Ala Leu Gln Arg
1010 1015 1020

Lys Leu Gly Leu Lys Gln Ala Asp Leu Pro Leu Val Gly Ile Ile
1025 1030 1035

Thr Arg Leu Thr His Gln Lys Gly Ile His Leu Ile Lys His Ala
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Ile Trp Arg Thr Leu Glu Arg Asn Gly Gln Val Val Leu Leu Gly
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Ser Ala Pro Asp Pro Arg Val Gln Asn Asp Phe Val Asn Leu Ala
1070 1075 1080

Asn Gln Leu His Ser Lys Tyr Asn Asp Arg Ala Arg Leu Cys Leu
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1100 1105 1110

Phe Ile Leu Val Pro Ser Ile Phe Glu Pro Cys Gly Leu Thr Gln
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1130 1135 1140

Gly Gly Leu Tyr Asp Thr Val Phe Asp Val Asp His Asp Lys Glu
1145 1150 1155

Arg Ala Gln Gln Cys Gly Leu Glu Pro Asn Gly Phe Ser Phe Asp
1160 1165 1170

Gly Ala Asp Ala Gly Gly Val Asp Tyr Ala Leu Asn Arg Ala Leu
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Ser Ala Trp Tyr Asp Gly Arg Asp Trp Phe Asn Ser Leu Cys Lys
1190 1195 1200

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<213> Solanum tuberosum

<400> 3

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<210> 4

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<213> Solanum tuberosum

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Arg Glu Asp Gly Cys Ile Val Tyr Arg Glu Trp Ala Pro Ala Ala Gln
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Met Met Glu Lys Asp Gln Phe Gly Val Trp Ser Ile Arg Ile Pro Asp
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Lys Tyr Ala Thr Ala Asp Ala Thr Lys Phe Ala Ala Pro Tyr Asp Gly
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Val Tyr Trp Asp Pro Pro Pro Ser Glu Arg Tyr His Phe Lys Tyr Pro
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Arg Pro Pro Lys Pro Arg Ala Pro Arg Ile Tyr Glu Ala His Val Gly
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Asp Val Leu Pro Arg Ile Lys Ala Asn Asn Tyr Asn Thr Val Gln Leu
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Thr Asn Phe Phe Ala Val Ser Asn Arg Tyr Gly Asn Pro Glu Asp Leu
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Asp Val Val His Ser His Ala Ser Asn Asn Val Thr Asp Gly Leu Asn
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Glu Arg Gly Tyr His Lys Leu Trp Asp Ser Arg Leu Phe Asn Tyr Ala
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Glu Glu Tyr Asn Phe Asp Gly Phe Arg Phe Asp Gly Ile Thr Ser Met
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Gly Gly Ile Gly Phe Asp Tyr Arg Leu Ala Met Ala Ile Pro Asp Lys
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Glu Val Thr Ser Ser Leu Thr Asn Arg Arg Tyr Thr Glu Lys Cys Ile
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Glu Lys Ser Ser Tyr Asn Ser Glu Phe Arg Pro Ser Thr Val Ala Ala
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Ser Gly Lys Val Leu Val Pro Gly Thr Gln Ser Asp Ser Ser Ser Ser
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Ser Thr Asp Gln Phe Glu Phe Thr Glu Thr Ser Pro Glu Asn Ser Pro
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Ala Ser Thr Asp Val Asp Ser Ser Thr Met Glu His Ala Ser Gln Ile
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Lys Thr Glu Asn Asp Asp Val Glu Pro Ser Ser Asp Leu Thr Gly Ser
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Val Glu Glu Leu Asp Phe Ala Ser Ser Leu Gln Leu Gln Glu Gly Gly
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Asp Glu Ser Asp Arg Ile Arg Glu Arg Gly Ile Pro Pro Pro Gly Leu
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Asp Lys Tyr Glu Gly Gly Leu Glu Ala Phe Ser Arg Gly Tyr Glu Lys
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Phe Leu Pro Asn Asn Val Asp Gly Ser Pro Ala Ile Pro His Gly Ser
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Arg Val Lys Ile Arg Met Asp Thr Pro Ser Gly Val Lys Asp Ser Ile
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Pro Ala Trp Ile Asn Tyr Ser Leu Gln Leu Pro Asp Glu Ile Pro Tyr
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His Pro Arg Pro Lys Lys Pro Lys Ser Leu Arg Ile Tyr Glu Ser His
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Gln Ile Met Ala Ile Gln Glu His Ser Tyr Tyr Ala Ser Phe Gly Tyr
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His Val Thr Asn Phe Phe Ala Pro Ser Ser Arg Phe Gly Thr Pro Asp
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Val His Thr Leu Thr Asn Arg Arg Trp Ser Glu Lys Cys Val Ser Tyr

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Lys Pro Gly Lys Tyr Pro Val Ala Leu Asp Ser Asp Asp Pro Leu Phe
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